



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

#11  
D.W. White  
4/20/02

In re Application of:  
Shih

Group Art Unit: 3743  
Examiner: L. Ciric

Serial No.: 09/410,896

Filed: Oct 2, 1999

For: Apparatus and Method For Cooling A  
Semiconductor Substrate

Attorney Docket No.: 67,200-207

RECEIVED

APR 19 2002

TECHNOLOGY CENTER R3700

**EXPRESS MAIL CERTIFICATE**

"Express Mail" label number EV 021 425 178US  
Date of Deposit April 8, 2002

I hereby certify that this paper in triplicate and a credit card payment form in the amount of \$320.00 (required filing fee) are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated above and is addressed to: Box Appeal, Assistant Commissioner for Patents, Washington, D.C. 20231

04/10/2002 HDEMESS1 00000075 09410896

01 FC:120

320.00 0P

  
Kathy Dixon

**APPEAL BRIEF**

Box Appeal  
Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Appellants appeal in the captioned application from the Examiner's final rejection, dated November 6, 2001, of claims 1-3, 5, 8-10, 12-16 and 18-20, under 35 USC §103(a) as being unpatentable over Moslehi.

It is urged that the rejection be reversed and that all the claims be allowed.

(1) REAL PARTY IN INTEREST

The real party in interest in the present appeal is the recorded Assignee of Taiwan Semiconductor Manufacturing Company, Ltd.

(2) RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that are known to the Appellant, the Appellant's legal representative, or the assignee.

(3) STATUS OF CLAIMS

Claims 1-3, 5, 8-10, 12-16 and 18-20 are pending in the application.

Claims 16, 18 and 20 have been cancelled in a Request for Reconsideration mailed January 3, 2002, which was accepted by the Examiner in an Advisory Action dated February 26, 2002.

Claims 1-3, 5, 8-10, 12-15 and 19 stand rejected.

(4) STATUS OF AMENDMENTS

A Request For Reconsideration was filed on or about January 3, 2002 which contained claim amendments.

An Advisory Action mailed February 26, 2002 by the Examiner which denied entering of the amendments, except the cancellation of claims 16, 18 and 20.

(5) SUMMARY OF THE INVENTION

The invention is directed to a cooling stage for holding a semiconductor substrate that is provided with a plurality of circular grooves concentrically formed in a top surface of the stage and a plurality of linear grooves formed in radial directions emanating from a center of the top surface in fluid communication with the plurality of circular grooves such that a cooling fluid flows through the grooves to improve cooling of the underside of a substrate placed on the stage and a method for cooling a semiconductor substrate.

(Specification, page 7, lines 5-10)

The first plurality may be at least three and the second plurality may be at least two, or the first plurality may be preferably five and the second plurality may be preferably three. The first plurality of circular grooves and the second plurality of linear grooves each may have a width between about 1 mm and about

7 mm, and a depth between about 1 mm and about 7 mm, or each may have a width preferably between about 3 mm and about 5 mm, and a depth preferably between about 1 mm and about 3 mm.

(6) **ISSUE**

Is the rejection of claims 1-3, 5, 8-10, 12-15 and 19 under 35 USC §103(a) as being unpatentable over Moslehi '745 proper when such reference does not teach or suggest the specifically claimed limitations in the present application?

(7) **GROUPING OF CLAIMS**

The rejection of claims 1-3, 5, 8-10, 12-15 and 19 are contested as a group.

(8) **ARGUMENTS**

Claims 1-3, 5, 8-10, 12-15 and 19 are rejected under 35 USC §103(a) as being unpatentable over Moslehi.

In the Response To Arguments section of the 11/06/01 Office Action, the Examiner notes that the Appellants' argument that the Moslehi reference does not clearly teach, disclose or suggest a second plurality of linear grooves that are in fluid communication with each and every one of a first plurality of

circular grooves, is not valid. The Examiner cited Figure 3 of Moslehi and col. 7, lines 3-15 of the same reference. The Examiner further argued that the term "a first plurality of circular grooves" is subjected to broad interpretation and therefore, may mean only the innermost two concentric circular grooves, as shown in Figure 3 of Moslehi.

The rejection of claims 1-3, 5, 8-10, 12-15 and 19 under 35 USC §103(a) based on Moslehi is improper and must be reversed.

The Appellants respectfully submit that the interpretation of the claim language is guided by the specification, including the drawings. Furthermore, dependent claims 2 and 3 define the term "first plurality" to be at least 3 (claim 2) or at least 5 (claim 3). Therefore, by interpreting the dependent claims, the specification and the drawings, the term "first plurality" necessarily indicates all the circular grooves provided on the surface of the pedestal which would include all three circular grooves shown by Moslehi in Figure 3. The Appellants therefore respectfully submit that Moslehi does not teach fluid communication between a second plurality of linear grooves with "each and everyone of said first plurality of circular grooves" to allow a cooling fluid to flow therethrough.

Claim 1 further recites:

"said first plurality of circular grooves and said second plurality of linear grooves each having a width between about 1 mm and about 7 mm, and a depth between about 1 mm and about 7 mm."

The Appellants respectfully submit that such is not taught or disclosed by Moslehi. Similar limitations are contained in independent method claim 8.

As the Court stated in W.L. Gore and Associates, Inc., v. Garlock, Inc., 721 F2d 1540, 220 USPQ 303 (Fed.Cir. 1983):

"To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher."

The rejection of claims 1-3, 5, 8-10, 12-15 and 19 under 35 USC §103(a) based on Moslehi is improper and must be reversed.

CLOSING

In summary, the Appellants have shown that their claimed invention is fully supported by a body of evidence of non-obviousness. It is therefore respectfully submitted that such evidence of non-obviousness overcomes any showing of obviousness presented by the Examiner. The Appellants therefore submit that the final rejection of their claims 1-3, 5, 8-10, 12-15 and 19 is improper under 35 USC §103(a).

The reversal of the final rejection is respectfully solicited from the Board.

Respectfully submitted,

Tung & Associates

By: 

\_\_\_\_\_  
Randy W. Tung  
Registration No. 31,311  
Telephone: (248) 540-4040

RWT\kd

CLAIM APPENDIX

1. A cooling stage for a semiconductor substrate comprising:

a pedestal having a substantially planar top surface,  
a first plurality of circular grooves concentrically formed in said top surface, and

a second plurality of linear grooves formed in radial directions emanating from a center of said top surface in fluid communication with each and everyone of said first plurality of circular grooves allowing a cooling fluid to flow therethrough when said semiconductor substrate is positioned on said top surface of the pedestal, said first plurality of circular grooves and said second plurality of linear grooves each having a width between about 1 mm and about 7 mm, and a depth between about 1 mm and about 7 mm.

2. A cooling stage for a semiconductor substrate according to claim 1, wherein said first plurality is at least three and said second plurality is at least two.

3. A cooling stage for a semiconductor substrate according to claim 1, wherein said first plurality is at least five and said second plurality is at least three.



5. A cooling stage for a semiconductor substrate according to claim 1, wherein said first plurality of circular grooves and said second plurality of linear grooves each having a width between about 3 mm and about 5 mm, and a depth between about 1 mm and about 3 mm.

8. A method for cooling a semiconductor substrate comprising the steps of:

providing a cooling stage comprising a wafer pedestal equipped with a grooved top surface thereon, said grooved top surface comprises a first plurality of circular grooves concentrically formed in said top surface and a second plurality of linear grooves formed in radial directions emanating from a center of said top surface in fluid communication with each and everyone of said first plurality of circular grooves, said first plurality of circular grooves and said second plurality of linear grooves each having a width between about 1 mm and about 7 mm, and a depth between about 1 mm and about 7 mm,

positioning a heated semiconductor substrate on said grooved top surface,

flowing a cooling liquid through a cooling channel in said wafer pedestal to carry away heat transferred to said grooved top surface, and

flowing a cooling gas through said first and second plurality of circular and linear grooves to carry away heat from a backside of said heated semiconductor substrate.

9. A method for cooling a semiconductor substrate according to claim 8, wherein said first plurality of circular grooves comprises at least three circular grooves and said second plurality of linear grooves comprises at least two linear grooves.

10. A method for cooling a semiconductor substrate according to claim 8, wherein said first plurality of circular grooves comprises at least five circular grooves and said second plurality of linear grooves comprises at least three linear grooves.

12. A method for cooling a semiconductor substrate according to claim 8 further comprising the step of providing said grooved top surface with a plurality of circular and linear grooves, each having a width between about 3 mm and about 5 mm, and a depth of between about 1 mm and about 3 mm.

13. A method for cooling a semiconductor substrate according to claim 8 further comprising the step of positioning a semiconductor substrate exiting a high temperature sputtering chamber on said grooved top surface of said cooling stage.

14. A method for cooling a semiconductor substrate according to claim 8 further comprising the step of removing a cooled-down semiconductor substrate from said cooling stage and positioning the substrate in a low temperature sputter chamber.

15. A method for cooling a semiconductor substrate according to claim 8 further comprising the steps of flowing a cooling liquid through said cooling channel in said wafer pedestal, and flowing a cooling gas of an inert gas through said first and second plurality of circular and linear grooves.

19. A wafer pedestal effective for cooling a high temperature processed wafer according to claim 16 wherein said at least three circular grooves comprises nine circular grooves and said at least two linear grooves comprises three linear grooves each having a width of about 2 mm and a depth of about 1 mm.



4-09-02

AF / 3743  
\$Attorney's Docket No. 67,200-207

PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Shih  
Serial No.: 09/ 410,896  
Filed: Oct. 2, 1999  
For: Apparatus and Method For Cooling A Semiconductor Substrate

Group Art Unit: 3743  
Examiner: L. Ciric

Assistant Commissioner for Patents  
Washington, D.C. 20231

## TRANSMITTAL OF APPEAL BRIEF (PATENT APPLICATION-37 CFR 192)

1. Transmitted herewith, in triplicate, is the APPEAL BRIEF in this application, with respect to the Notice of Appeal Filed on February 6, 2002.

NOTE: "The Appellant shall, within 2 months from the date of the notice of appeal under §1.191(a) or within the time allowed for response to the action appealed from, if such time is later, file a brief in "triplicate", 37 C.F.R. 1.192(a) [emphasis added].

2. STATUS OF APPLICANT

This application is on behalf of:

X other than a small entity.  
\_\_\_ a small entity.

A verified statement:

\_\_\_ is attached.  
\_\_\_ was already filed.

3. FEE FOR FILING APPEAL BRIEF

Pursuant to 37 CFR 1.17(f), the fee for filing the Appeal Brief is:

\_\_\_ small entity \$160.00  
X other than a small entity \$320.00

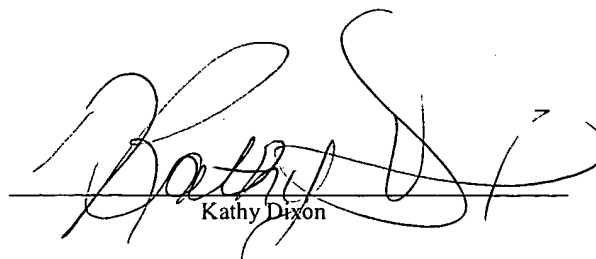
Appeal Brief fee due: \$ 320.00

Certificate of Mailing/Transmission (37 CFR 1.8(a))

I hereby certify that this correspondence is, on the date shown below, being:

Mailing  
X deposited with the U.S. Postal Service  
with sufficient postage as Express Mail  
Label No. EV 021 425 178 US  
in an envelope addressed to Box Appeal,  
Assistant Commissioner for Patents,  
Washington, D.C. 20231

Dated: April 8, 2002

  
Kathy Dixon

RECEIVED  
APR 19 2002  
TECHNOLOGY CENTER R3700

4. EXTENSION OF TERM

NOTE: The time periods set forth in 37 CFR 1.192(a) are subject to the provision of ☐ 1.136 for patent applications. 37 CFR 1.191(d). See also Notice of November 5, 1985 (1060 O.G. 27).

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136 apply:

(complete (a) or (b), as applicable)

- (a) ☐ Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d) for the total number of months checked below:

	Extension (months)	Fee for other than small entity	Fee for small entity
<input type="checkbox"/>	one month	\$ 110.00	\$ 55.00
<input type="checkbox"/>	two months	\$ 390.00	\$195.00
<input type="checkbox"/>	three months	\$ 930.00	\$465.00
<input type="checkbox"/>	four months	\$1,470.00	\$735.00

Fee: \$ \_\_\_\_\_

If an additional extension of time is required, please consider this a petition therefor.

(check and complete the next item, if applicable)

- ☐ An extension for \_\_\_\_\_ months has already been secured, and the fee paid therefor of \$ \_\_\_\_\_ is deducted from the total fee due for the total months of extension now requested.

Extension fee due with this request: \$ \_\_\_\_\_

or

- (b) ☐ Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

5. TOTAL FEE DUE

The total fee due is:

Appeal Brief Fee: \$ 320.00  
Extension fee (if any) \$ \_\_\_\_\_

TOTAL FEE DUE: \$ 320.00

6. FEE PAYMENT

X Attached is a Credit Card Payment Form for the sum of \$ 320.00  
X Charge Visa Credit Card No. 4756 8461 9568 0263 the sum of \$ 320.00.  
A duplicate copy of this transmittal is attached.

7. FEE DEFICIENCY

NOTE: If there is a fee deficiency and there is no authorization to charge an account, additional fees are necessary to cover the additional time consumed in making up the original deficiency. If the maximum six-month period has expired before the deficiency is noted and corrected, the application is held abandoned. In those instances where authorization to charge is included, processing delays are encountered in returning the papers to the PTO Finance Branch in order to apply these charges prior to action on the cases. Authorization to charge the deposit account for any fee deficiency should be checked. See the Notice of April 7, 1986, 1065 O.G. 31-33.

  X   If any additional extension and/or fee is required, this is a request therefor  
to charge Visa Credit Card No. 4756 8461 9568 0263

And/Or

  X   If any additional fee for claims is required, please charge Visa Credit Card  
No. 4756 8461 9568 0263



\_\_\_\_\_  
Signature of Attorney

Registration No. 31,311

Telephone: (248) 540-4040

Randy W. Tung

Tung & Associates  
838 W. Long Lake Road, Ste. 120  
Bloomfield Hills, Michigan 48302